ONTARIO MINISTRY OF ENVIRONMENT
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1969

OPERATING SUMMARY

BELLEVILLE

water pollution control plant

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RCES COMMISSION

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ONTARIO WATER RESOURCES COMMISSION

Division of Plant Operations

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Belleville : water pollution
control plant.

81623

Water management in Ontario

Ontario
Water Resources
Commission

135 St. Clair Ave. W.
Toronto 195
Ontario

The operating efficiency and financial status of the water pollution control facilities operated for you in 1969 are presented in the following pages.

The regional operations engineer's comments and the statistical data will assist you in gauging the plant's level of performance. A new flow chart and up-to-date design data are also provided.

Various divisions and sections within the Commission have co-operated in providing what we trust is an accurate and concise annual operating summary.

DSCaverly
D.S. Caverly,
General Manager.

DMcTavish
D.A. McTavish, P. Eng.,
Director,
Division of Plant Operations.

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J. N. Dick

135 St. Clair Avenue West
Toronto 7

BELLEVILLE

water pollution control plant

operated for

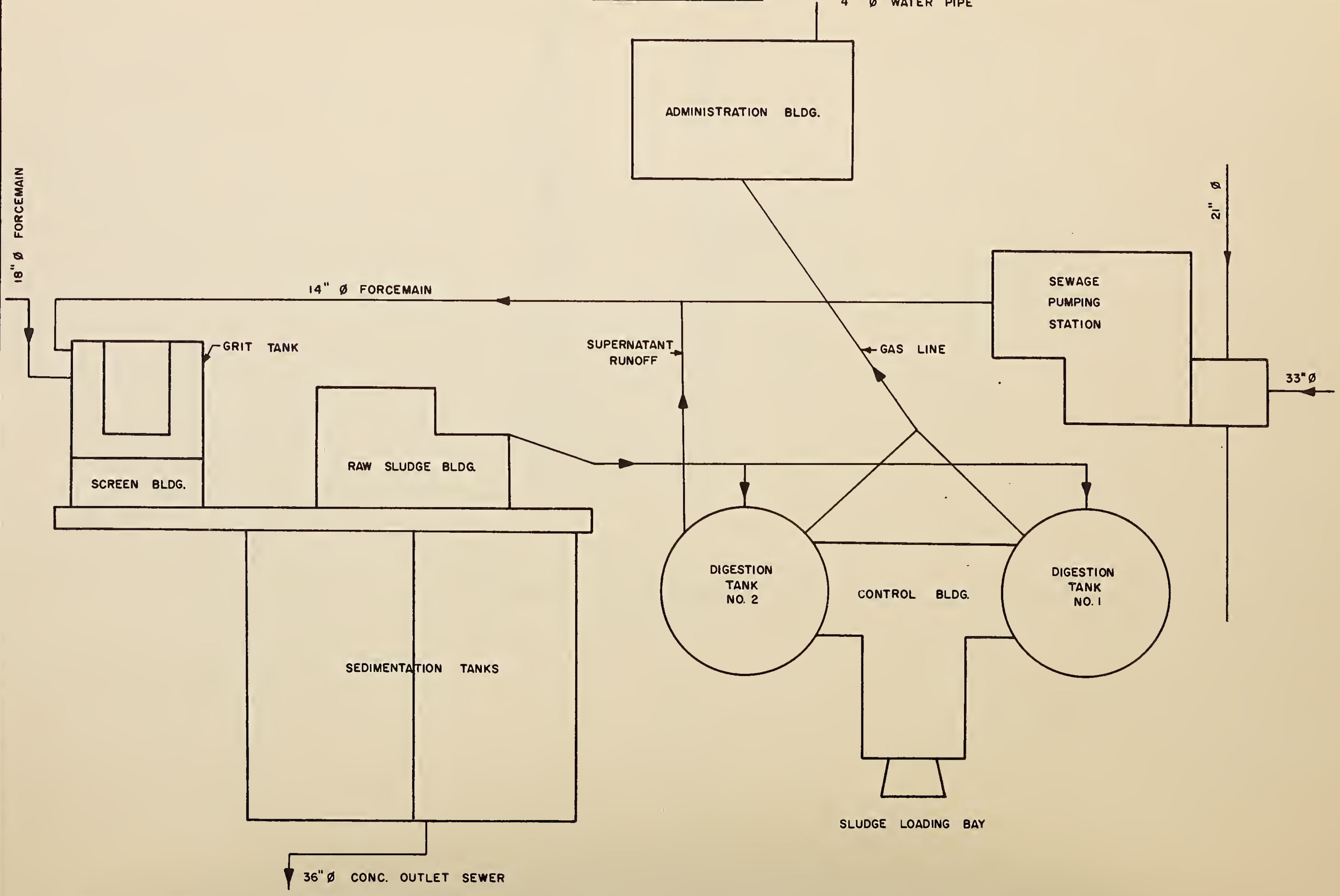
THE CITY OF BELLEVILLE

by the

ONTARIO WATER RESOURCES COMMISSION

1969 ANNUAL OPERATING SUMMARY

FLOW DIAGRAM



DESIGN DATA

PROJECT NO.	2-0084-61	TREATMENT	Primary
DESIGN FLOW	3.0 mgd	DESIGN POPULATION	30,000
BOD - Raw Sewage - Removal	225 mg/l 30%	SS - Raw Sewage Removal	260 mg/l 65%

PRIMARY TREATMENT

Grit Removal

Type: Aerated grit tank with grab bucket
Size: One 24' x 14' x 12½' (26,200 gal)
Retention: 12.5 min
Air Supply: Two Roots blowers, 610 cfm ea

Screening

Type: Mechanically cleaned
Size: 2" opening

Comminution

Type: Chicago pump barminutor
Model C

Primary Sedimentation

Type: Rex chainbelt
Size: Four 70' x 18' x 12' (377,500 gal)
Retention: 3.0 hours
Loading: Surface, 600 gal/ft^2/day
Weir, 11,000 gal/ft/day

CHLORINATION

Type: F & P model 70C3410B
Size: One 1,000 lb/day

Chlorine Contact Chamber

- in outfall

OUTFALL

- 1179' of 36" dia concrete pipe
  300' of 33" dia concrete pipe
  to Bay of Quinte

SLUDGE HANDLING

Digestion System

Type: Two-stage
Primary --
Type: Gas mixed
Size: One 45' dia x 25' swd
(40,000 cu ft or 249,000 gal)
Loading: 3.82 lb/cu ft/mo
Secondary --
Type: Fixed cover
Size: One 45' dia x 25' swd
(40,000 cu ft or 249,000 gal)
Total Loading: 1.91 lb/cu ft/mo

Gas Booster

Type: Spencer
Size: One 150 cfm

PUMPING STATIONS

(a) Plant Site (@ 35' tdh)

One Worthington 2500 gpm (electric)
One Worthington 1666 gpm (electric)
One Worthington 2500 gpm (diesel)

(b) Front Street (@ 55' tdh)

One Worthington 2500 gpm (electric)
One Worthington 1666 gpm (electric)
One Worthington 3332 gpm (diesel)

(c) Dundas Street West (@ 29' tdh)

One Worthington 416 gpm (electric)
One Worthington 1300 gpm (diesel)

'69 REVIEW

GENERAL

The Nos. 1, 2 and 4 pumps in the Front St. pumping station were completely overhauled in 1969. New shafts, sleeves and bearings were installed in all pumps, along with a new impeller in the No. 2 pump. The dry well of the station was flooded four times during the year due to pump packing failures. These problems were attributed to flows much greater than design causing high pumping heads, which result in an abnormal strain on the pumping equipment.

New impellers were installed in the No. 2 air blower, and the drive gears in the barminutor were replaced twice.

The 18" diameter forcemain from the Front St. pumping station to the plant broke during the summer. The break was caused by improper installation of a thrust block at the time of construction. The forcemain was repaired quickly by the Department of Public Works, who provided excellent co-operation.

The transformer stations at the plant site and at the Front St. pumping station were inspected. Two faulty breakers were discovered and new units ordered.

The basement of the digester building was flooded with sludge when a sight glass on the heat exchanger burst. Considerable clean-up and painting were required to restore the building to its original condition.

The No. 1 and No. 2 pumps in the Dundas St. pumping station were completely overhauled. This involved installation of new sleeves, shafts, and bearings. The dry wells of the plant pumping station and the Dundas St. pumping station were flooded twice, due to packing failure and raw sewage backing up through floor drains on the mezzanine levels. The installation of check valves and an alarm system should prevent further floodings in all pumping station dry wells.

A half-ton pick up truck was purchased for the plant to reduce travel costs for inspections of pumping stations and local plant business.

Final design drawings for the enlargement of the plant were completed in 1969. The enlargement will allow secondary treatment and increased plant capacities of 8 mgd (primary treatment) and 6 mgd (secondary treatment). Tenders for the enlargement will be received early in 1970 and construction should start in the spring of 1970.

PROJECT STAFF

The plant was inspected by Head Office personnel on a regular basis during the year and was always found in satisfactory condition. The plant staff are to be commended for their good work and efficient operation.

EXPENDITURES

The operating cost for the year was $82,403.67, an increase of $10,843.14 over 1968. As a result, the unit cost of treating one million gallons of sewage nearly doubled from $23.98 to $42.68.

This increase was caused by higher taxes (about $6,000 more than the previous year), more equipment expenditure ($2,500), and increased water costs ($1,000) due to year-round chlorination.

FLOWS

In 1969, the plant treated a total of 1930 million gallons of waste, or an average daily flow of 5.30 mil. gal. This was 176 percent of the design capacity of 3.0 mgd. The design flow was exceeded without exception throughout the year.

PLANT EFFICIENCY

The average BOD and suspended solids concentrations were 35 mg/l and 96 mg/l respectively in the final effluent, and 82 mg/l and 165 mg/l in the raw sewage. The percent reductions of BOD and suspended solids were 57 and 42 respectively.

In 1968, the average concentrations were 114 and 234 mg/l, and 55 and 114 mg/l in the final effluent.

CONCLUSIONS

The plant operated very satisfactorily in 1969 considering the high flows to the plant. Tenders have been called for the enlargement of the Belleville plant, and construction should be started in the spring of 1970.

PROJECT COSTS

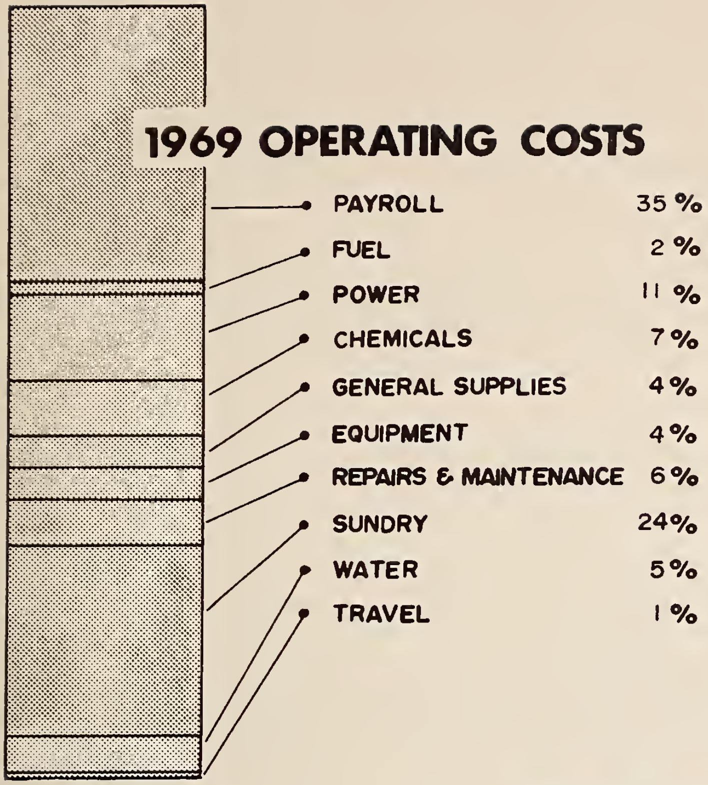
NET CAPITAL COST (Final)	$2,009,824.50
DEDUCT - Portion financed by CMHC/MDLB (Final)	1,283,187.17
Long Term Debt to OWRC	$ 726,637.33

Debt Retirement Balance at Credit (Sinking Fund) December 31, 1969	$ 112,117.34

Net Operating	$ 82,403.67
Debt Retirement	14,664.00
Reserve	9,949.62
Interest Charged	40,680.69
TOTAL	$ 147,697.98

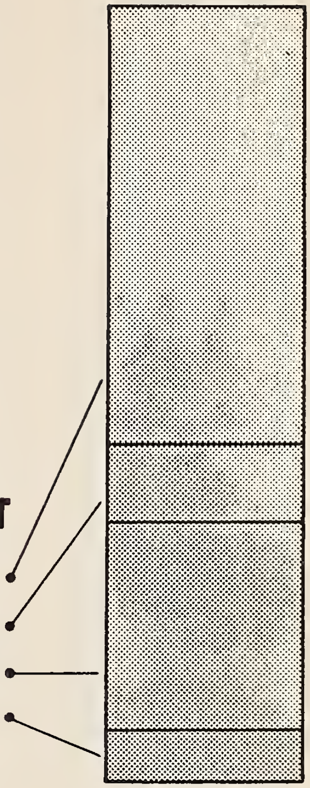
RESERVE ACCOUNT

Balance @ January 1, 1969	$ 80,427.88
Deposited by Municipality	9,949.62
Interest Earned	4,794.24
	$ 95,171.74
Less Expenditures	-
Balance @ December 31, 1969	$ 95,171.74



1969 OPERATING COSTS

TOTAL ANNUAL COST



Yearly Operating Costs

YEAR	MILLION GALLONS TREATED	TOTAL OPERATING COSTS	COST PER MILLION GAL	COST PER LB OF BOD REMOVED
1965	2070	$45,122.00	$21.80	5 cents
1966	1994	51,665.00	25.91	8 cents
1967	2396	55,314.00	23.09	3 cents
1968	2170	71,560.00	32.98	6 cents
1969	1931	82,403.67	42.68	9 cents

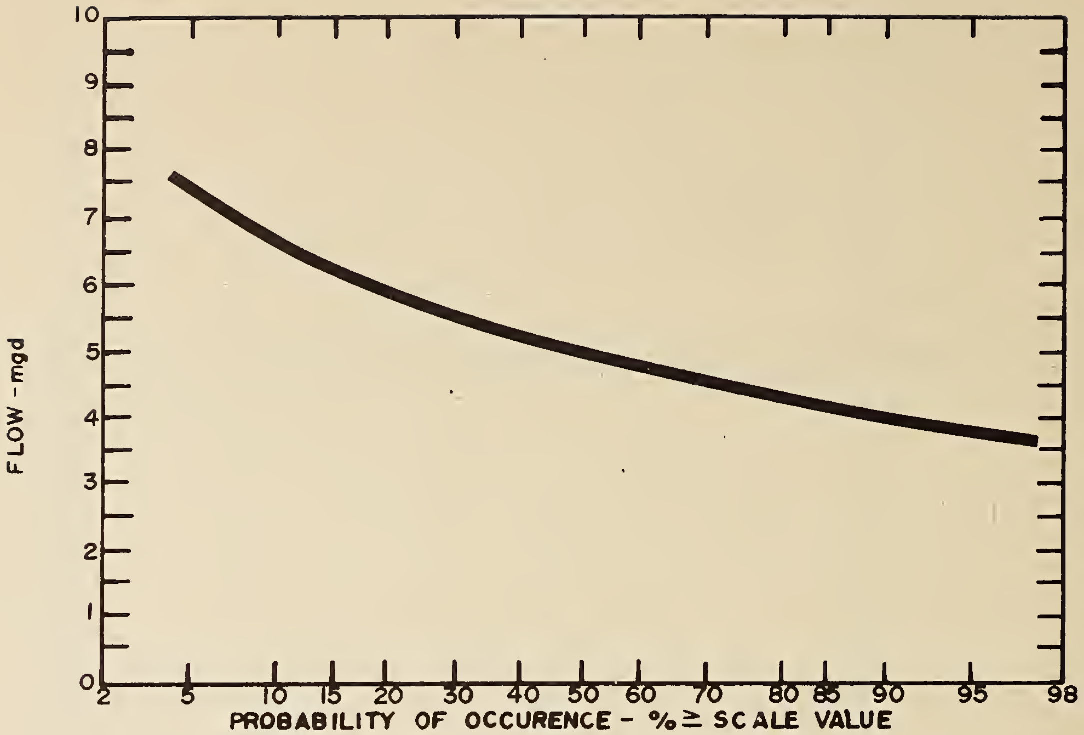
Monthly Operating Costs

MONTH	TOTAL EXPENDITURE	PAYROLL	CASUAL PAYROLL	FUEL	POWER	CHEMICALS	GENERAL SUPPLIES	EQUIPMENT	REPAIRS and MAINTENANCE	SUNDRY *	WATER	TRAVEL
JAN	5584.00	3287.73	-	103.25	409.37	1198.05	88.36	-	-	173.94	250.85	72.45
FEB	3825.46	2070.66	-	236.00	877.29	-	142.86	-	89.61	26.73	316.61	65.70
MAR	3924.52	1633.77	-	250.75	734.39	-	102.97	6.61	653.66	261.41	213.76	67.20
APR	5135.81	2279.78	-	118.00	763.33	1198.05	233.66	-	149.28	54.39	264.92	74.40
MAY	4960.79	2161.00	-	118.00	759.95	-	288.01	498.55	411.31	398.84	253.43	71.70
JUNE	5065.88	2196.82	-	132.75	618.37	-	255.18	514.79	892.18	169.20	214.74	71.85
JULY	6797.39	2194.20	280.00	132.75	880.37	1051.05	648.63	-	921.37	279.53	320.99	88.50
AUG	7479.29	3446.82	719.72	-	639.21	-	636.51	30.40	466.70	1118.95	327.68	93.30
SEPT	5921.58	2267.71	25.20	211.46	705.30	-	91.81	1464.23	707.54	1.51	371.07	75.75
OCT	20061.47	2139.72	4.49	116.20	522.03	1051.05	249.19	(7.64)	229.94	15279.00	413.14	64.35
NOV	3927.63	2210.39	-	-	638.53	-	229.65	-	55.07	104.41	489.96	199.62
DEC	9719.85	2173.22	-	533.00	1158.82	1051.05	730.57	845.00	761.97	1869.20	468.59	128.43
TOTAL	82403.67	28061.82	1029.41	1952.16	8706.96	5549.25	3697.40	3351.94	5338.63	19737.11	3905.74	1073.25

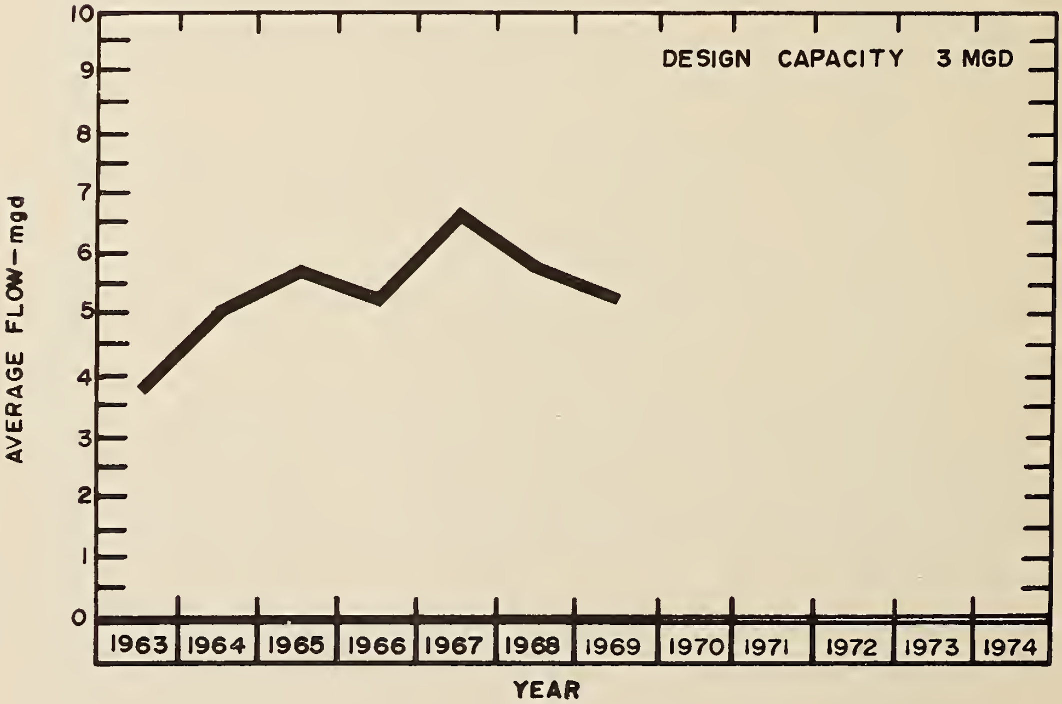
BRACKETS INDICATE CREDIT

* SUNDRY INCLUDES SLUDGE HAULAGE COSTS WHICH WERE $1630.80

PROCESS DATA

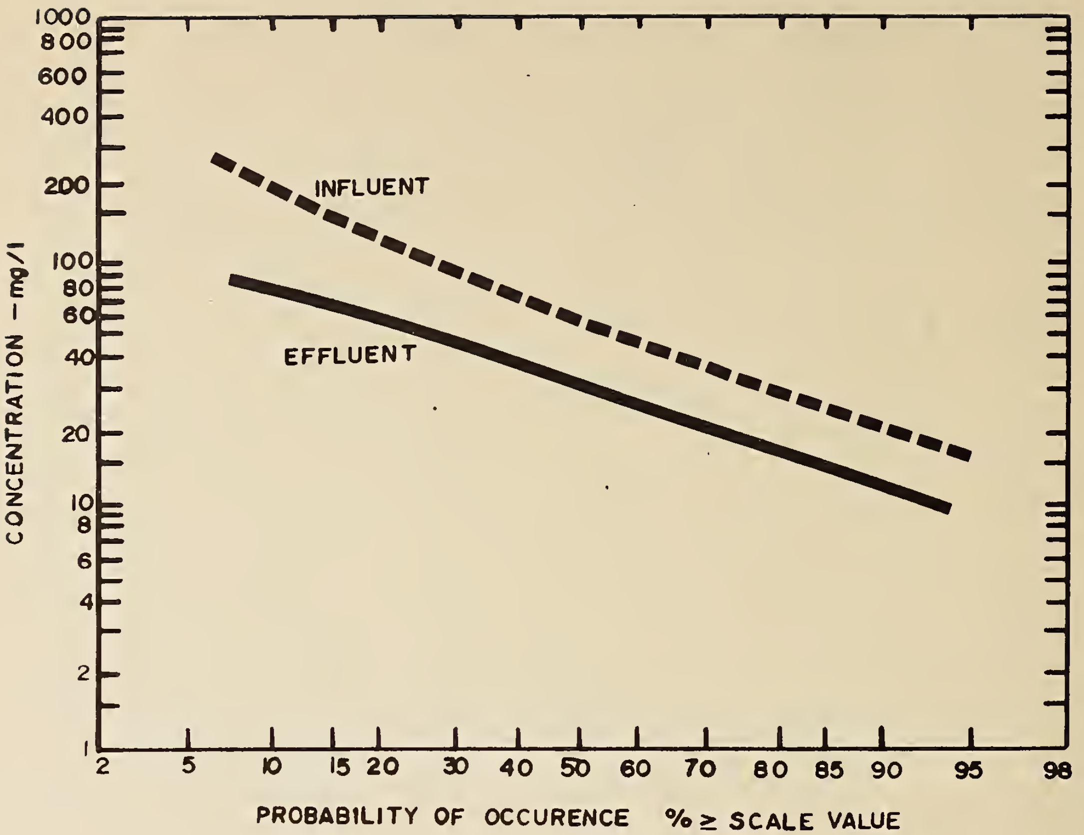

FLOW - mgd
0
1
2
3
4
5
6
7
8
9
10
2
5
10
15
20
30
40
50
60
70
80
85
90
95
98
PROBABILITY OF OCCURENCE - % ≥ SCALE VALUE

FLOWS

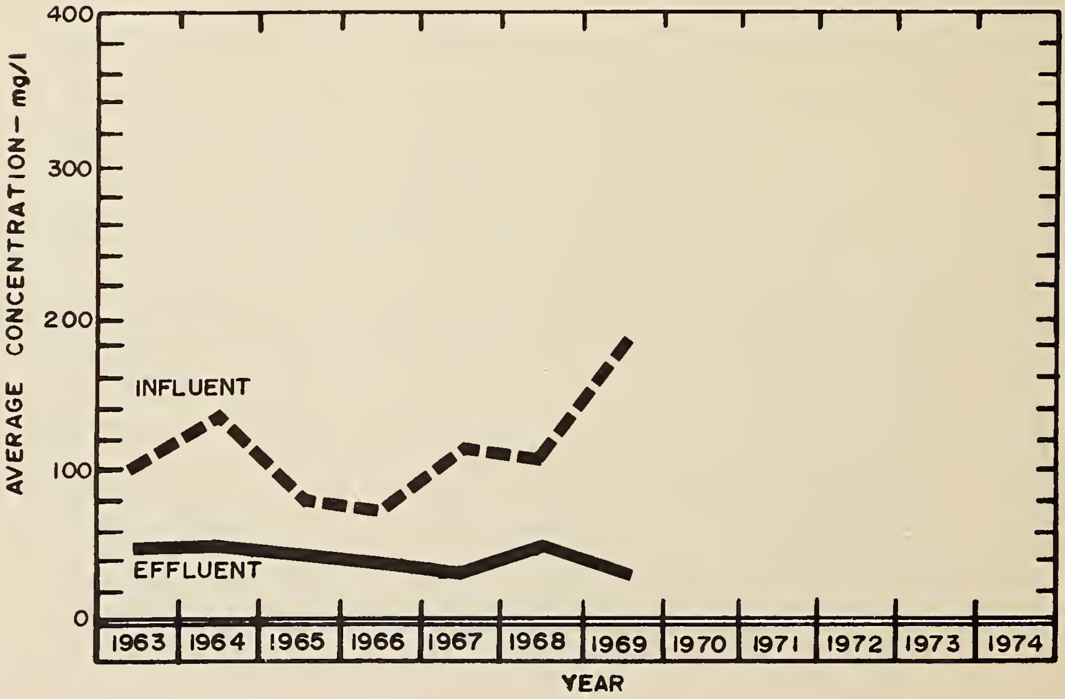

AVERAGE FLOW-mgd
DESIGN CAPACITY 3 MGD
0
1
2
3
4
5
6
7
8
9
10
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
YEAR

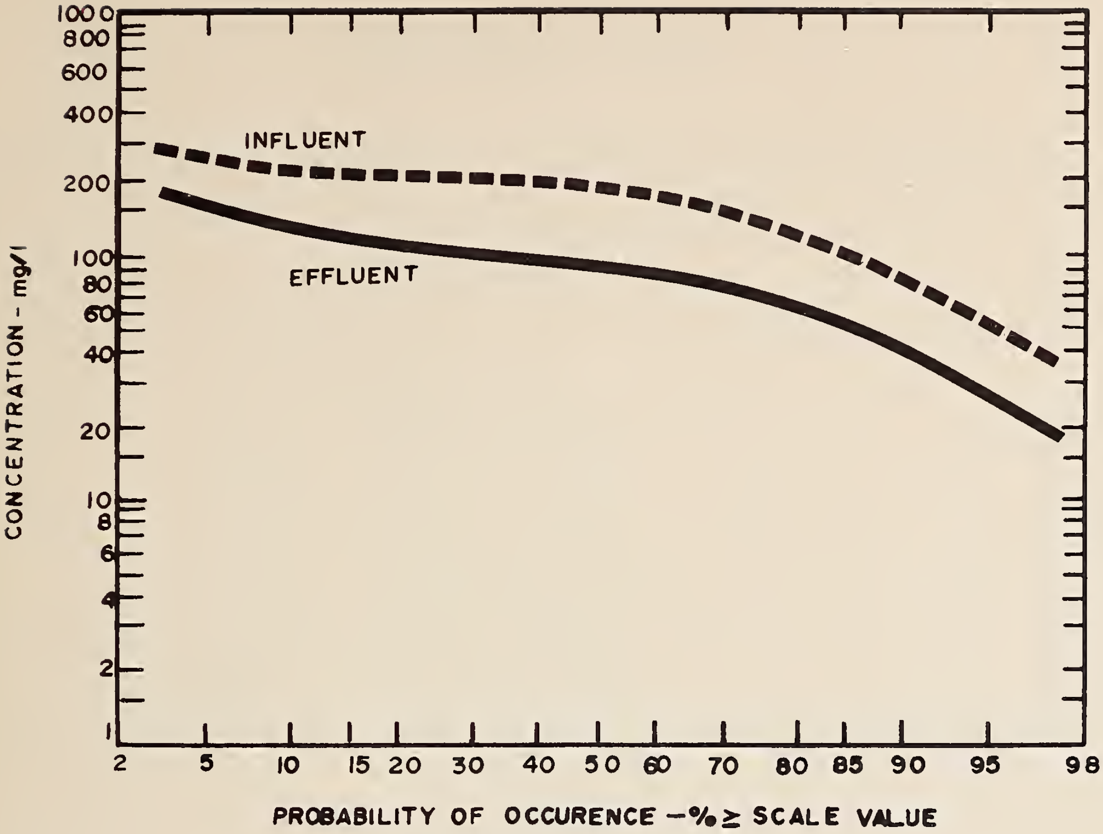
PLANT FLOWS and CHLORINATION

MONTH	TOTAL FLOW mil gal	AVERAGE DAILY FLOW mil gal	MAXIMUM DAILY FLOW mil gal	MINIMUM DAILY FLOW mil gal	CHLORINE USED pounds	DOSAGE mg/l
JAN	172.8	5.6	7.9	4.6	4755	2.8
FEB	161.8	5.8	7.7	4.6	5026	3.1
MAR	181.0	5.8	8.5	4.4	4725	2.6
APR	197.3	6.6	8.0	5.5	4415	2.2
MAY	189.3	6.7	9.1	4.9	4445	2.6
JUNE	168.0	5.6	7.7	4.6	5105	3.0
JULY	142.6	4.6	6.1	3.7	5205	3.6
AUG	142.2	4.6	5.7	3.8	5500	3.9
SEPT	128.5	4.3	4.7	3.7	5670	4.4
OCT	127.0	4.1	4.6	3.0	5980	4.7
NOV	157.7	5.3	7.0	3.7	5680	3.6
DEC	162.4	5.2	10.0	3.1	6120	3.8
TOTAL	1930.6	-	-	-	62626	-
AVERAGE	-	5.3	-	-	5219	3.2

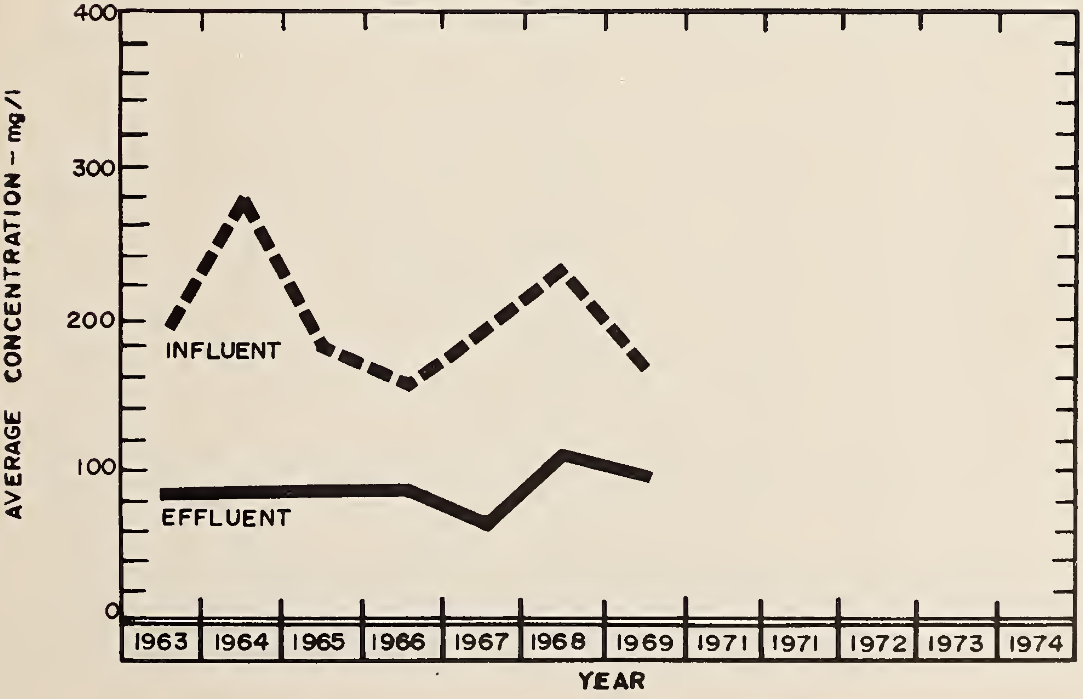


BIOCHEMICAL OXYGEN DEMAND



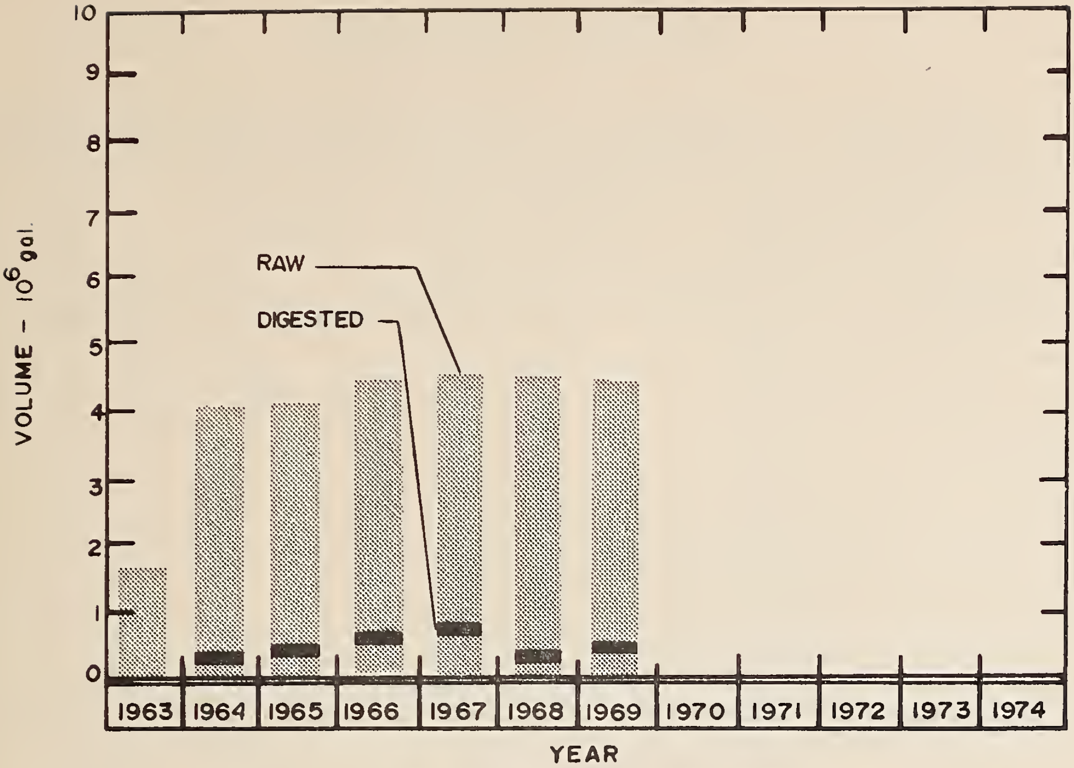


SUSPENDED SOLIDS



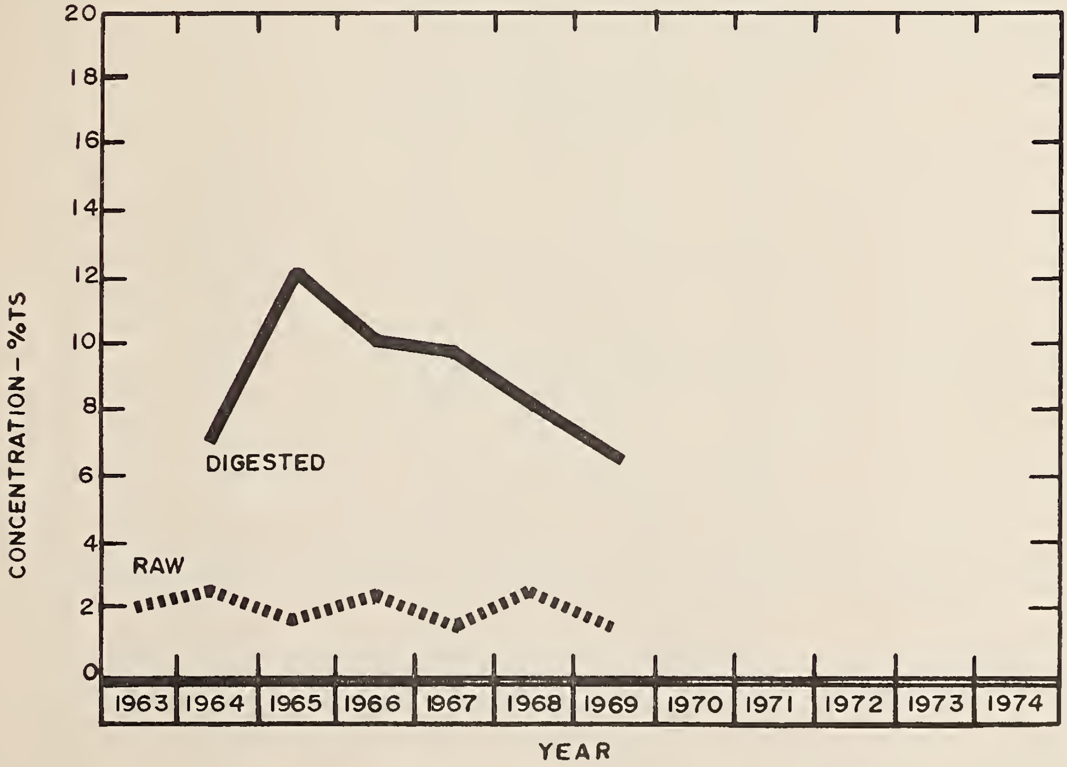
PLANT EFFICIENCY

MONTH	BIOCHEMICAL OXYGEN DEMAND				SUSPENDED SOLIDS				GRIT REMOVAL
	INF.	EFF.	REDUCTION		INF. CONCN	EFF. CONCN	REDUCTION		
	mg/l	mg/l	%	10^4 pounds	mg/l	mg/l	%	10^4 pounds	cu ft
JAN	–	–	–	–	212	105	51	18.5	0
FEB	70	50	29	3.2	222	119	46	15.7	135
MAR	160	75	53	15.4	190	105	45	15.4	0
APR	75	40	47	6.9	168	103	39	12.8	0
MAY	140	70	50	13.3	162	90	44	13.6	0
JUNE	240	26	89	36.0	168	86	49	13.8	0
JULY	34	11	68	3.3	147	73	50	10.6	410
AUG	17	9	47	1.1	92	75	18	2.4	0
SEPT	50	22	56	3.6	163	81	50	10.5	0
OCT	38	25	34	1.6	188	175	7	1.6	0
NOV	42	37	12	.8	120	60	50	9.4	162
DEC	31	17	45	2.3	145	75	48	11.4	0
TOTAL	-	-	-	-	-	-	-	-	707
AVERAGE	82	35	57	8.0	165	96	42	11.4	-



VOLUME - 10^6 gal.
10
9
8
7
6
5
4
3
2
1
0
RAW
DIGESTED
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
YEAR

DIGESTION



CONCENTRATION - %TS
20
18
16
14
12
10
8
6
4
2
0
DIGESTED
RAW
1963
1964
1965
1966
1967
1968
1969
1970
1971
1972
1973
1974
YEAR

SLUDGE DISPOSAL

MONTH	RAW SLUDGE			DIGESTED SLUDGE			SUPERNATANT		SLUDGE DISPOSAL	
	VOLUME 10^5 gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10^5 gal	TOTAL SOLIDS %	VOL SOLIDS %	VOLUME 10^5 gal	TOTAL SOLIDS %	LIQUID cu yd	DEWATERED cu yd
JAN	3.8	1.8	46	.42	-	-	2.9	.06	252	-
FEB	3.4	1.6	51	0	-	-	2.5	.03	0	-
MAR	3.9	1.7	63	.55	-	-	2.9	.02	324	-
APR	3.7	1.8	58	.54	-	-	3.5	.03	322	-
MAY	3.8	1.1	55	.64	6.4	42	3.5	.06	378	-
JUNE	3.7	1.6	49	0	-	-	3.6	.01	0	-
JULY	3.8	1.8	51	0	-	-	2.9	.05	0	-
AUG	3.8	1.6	54	.59	6.3	-	2.9	.03	348	-
SEPT	3.7	1.5	45	.57	-	-	3.6	.03	336	-
OCT	3.4	2.0	50	.60	-	-	2.9	.01	354	-
NOV	3.7	2.0	49	.50	-	-	2.8	.02	294	-
DEC	3.8	1.8	52	.54	-	-	5.1	.02	321	-
TOTAL	44.5	-	-	4.95	-	-	-	-	2929	-
AVERAGE	3.7	1.6	51	.55	6.4	42	3.3	.14	325	-

Date Due

ONTARIO WATER RESOURCES COMMISSION
DIVISION OF PLANT OPERATIONS.

BELLEVILLE
OPERATING SUMMARY 1969

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